

# Claims

- [c1] 1. A semiconductor device including a gate, a source, and a drain, said semiconductor device comprising:  
a sidewall film covering a side surface of said gate; and  
a low permittivity region locally provided at a lower portion of the side surface of said gate with the low permittivity region being covered by said sidewall film.
- [c2] 2. The semiconductor device according to claim 1,  
wherein said low permittivity region is made of a lower permittivity material as compared to said sidewall film.
- [c3] 3. The semiconductor device according to claim 2,  
wherein said sidewall film includes  
a first film directly formed at an upper portion of said side surface of said gate, and  
a second film formed on said first film to cover said low permittivity region directly formed at the lower portion of the side surface of said gate.
- [c4] 4. The semiconductor device according to claim 1,  
wherein said low permittivity region is a cavity.
- [c5] 5. The semiconductor device according to claim 4,  
wherein said sidewall film includes

a first film directly formed only at an upper portion of said side surface of said gate, and  
a third film covering said first film to form the cavity only at a lower portion of said side surface.

[c6] 6. The semiconductor device according to claim 1, wherein a part of a side wall lower portion of said gate is removed to have said low permittivity region formed into a notched shape.

[c7] 7. The semiconductor device according to claim 6, wherein said low permittivity region is made of a lower permittivity material as compared to said sidewall film.

[c8] 8. The semiconductor device according to claim 6, wherein said low permittivity region is a cavity.

[c9] 9. A method for manufacturing a semiconductor device including a gate, a source, and a drain, said method comprising the steps of:  
forming a thin first film covering a side surface of said gate;  
removing only a lower portion of said first film;  
locally filling only a lower portion of the side surface of said gate, at which said first film is removed, with a low permittivity material; and  
forming a second film on said first film to cover said low

permittivity material.

- [c10] 10. A method for manufacturing a semiconductor device including a gate, a source, and a drain, said method comprising the steps of:  
forming a thin first film covering a side surface of said gate;  
removing only a lower portion of said first film; and  
forming a second film on said first film with low step coverage, to thereby form a cavity at a lower portion of the side surface of said gate.
- [c11] 11. A method for manufacturing a semiconductor device including a gate, a source, and a drain, said method comprising the steps of:  
removing a part of a side wall lower portion of said gate to process it into a notched shape;  
locally filling only said part with a low permittivity material; and  
forming a sidewall film on a side surface of said gate to cover said low permittivity material.
- [c12] 12. A method for manufacturing a semiconductor device including a gate, a source, and a drain, said method comprising the steps of:  
removing a part of a side wall lower portion of said gate to process it into a notch shape; and

forming a sidewall film on a side surface of said gate with low step coverage to such an extent as not to fill in said part, to thereby form a cavity at a lower portion of the side surface of said gate.